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VARICHAETADRILUS, A NEW NAME FOR *VARICHAETA* BRINKHURST, 1981, *NON* SPEISER, 1903, (DIPTERA) WITH A DESCRIPTION OF A NEW SPECIES *V. FULLERI*

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Abstract.—The genus *Varichaeta* Brinkhurst, 1981, is renamed *Varichaetadrilus*. *Varichaetadrilus fulleri*, new species, is described from material collected in Kentucky. The species has distinctive penes and lacks dorsal hair and pectinate setae; all setae are bifid. The *bifidus* form of *V. pacificus* is described. It differs from the typical form by the lack of hair and pectinate setae.

The genus *Varichaeta* Brinkhurst, 1981, was erected because a clear distinction could be made between the male ducts of this genus and those of *Isochaetides* Hrabě, 1966 (Brinkhurst 1981). Two of the previous *Varichaeta* species had been assigned to *Isochaetides* (or its precursor *Isochaeta* Pointner, 1911; see Brinkhurst 1981 for clarification) as all of the species involved have very long, tubular male ducts. In *Isochaetides* the vasa deferentia are very long and the atria are quite short, but in *Varichaeta* the atria are at least as long as the vasa deferentia. The penes in *Varichaeta* are unusually large, erectile, and have short cuticular sheaths at the distal end only. The *Isochaeta–Isochaetides* complex belongs to those few genera in which all the species lack dorsal hair and pectinate setae (i.e., *Clitellio* Savigny, 1820, and *Limnodrilus* Claparède, 1862) which is the basis for the name. Other genera (*Potamothrix* Vejdovský and Mrázek, *Aulodrilus* Bretscher for example), contain species with hair and pectinate setae and others that lack them, but there has never been any suggestion of splitting these genera on the basis of setal pattern. In fact, this degree of variation is given only subspecific or varietal status by several authors in the absence of any other significant differences in the taxa concerned (see *Tubifex tubifex* (Müller, 1774); *Ilyodrilus frantzi* Brinkhurst, 1965; *Potamothrix prespaensis* (Hrabě, 1931)—all in Brinkhurst 1971).

While the male ducts of *V. nevadana* (Brinkhurst, 1965) and *V. israelis* (Brinkhurst, 1971) were thought to be of the form found in *Isochaeta–Isochaetides*, the inclusion of both species in that complex was therefore acceptable despite the presence of hair and pectinate setae. Once the male ducts of these two plus *V. pacifica* Brinkhurst, 1981, could be recognized as distinctive, the genera were separated by Brinkhurst (1981). The name *Varichaeta* was used to indicate the presence of hair and pectinate setae in contrast to *Isochaeta*. As the name *Varichaeta* proves to be preoccupied (*Varichaeta* Speiser, 1903–Diptera) we now propose the name *Varichaetadrilus* for the three known species, *Varichaetadrilus pacificus* (Brinkhurst, 1981) new combination (type-species), *Varichaetadrilus nevadana* (Brinkhurst, 1965) new combination, and *Varichaetadrilus israelis* (Brinkhurst, 1971) new combination.

In addition, specimens collected by S. L. H. Fuller (Academy of Natural Sci-

ences, Philadelphia) in Kentucky prove to belong to this genus, and these will now be described.

Varichaetadrilus fulleri, new species
Fig. 1

Diagnosis.—Worms up to 50 mm long, about 1 mm wide anteriorly, more than 200 segments. Prostomium small, pharynx large and eversible, septa in anterior segments very thick, muscular. Setae bifid, 2–3 or up to 5 per bundle anteriorly, 1, sometimes 2 from behind the clitellum; upper teeth shorter than the lower in 1 or 2 anterior segments, longer than the lower in most preclitellar bundles (or worn and broken to appear shorter); upper teeth shorter and thinner than the lower posteriorly. No genital setae. Spermathecal pores in position of missing ventral setae of X, male pores slightly median to line of (missing) ventral setae of XI, female pores in the same line in 11/12. Spermathecae voluminous with elongate spermatozeugma; ducts wide, capacious with folded walls and cervix-like plugs between ampullae and ducts. Male ducts exceedingly long, both vasa deferentia and atria elongate; prostate glands small, attached to atria close to union with vasa deferentia; penes very large, erectile, with cuticular sheaths on distal ends only; terminal parts of ejaculatory ducts make S-bends before entering penes.

Material examined.—Holotype: USNM 79466, 1 dissected mature specimen on 2 slides, Canada Balsam preparation. Type-locality: 3.2 miles WNW of Birk City, Daviess Co., Kentucky, 11 July 1981. Paratypes: 2 mature specimens, Academy of Natural Sciences, Philadelphia, coll. 3.2 miles WNW of Birk City, Davies Co., 30 July 1981; USNM 79467–79475, 8 mature and 6 immature specimens on 12 slides; Brinkhurst collection: 1 mature specimen on 1 slide; Kathman collection: 1 mature specimen on 1 slide; localities as above plus other localities near Birk City and Green River 3.5 miles SE of Calhoun, McLean County, Kentucky, all coll. S. L. H. Fuller, May–July 1981.

Etymology.—"*fulleri*"—for S. L. H. Fuller, the collector.

Remarks.—The enormously elongate male ducts are impossible to illustrate in their entirety as they cannot be dissected out in one piece or seen in whole mounts with ease, but they resemble those of the other species in the genus. The relative length of each vas deferens cannot be determined but the recognition of several fragments of the vas suggests it may be as long as the atrium. The penes are erectile and are seen in various degrees of retraction in the material available. The setae are all bifid, unlike those of the other species in the genus, but this does not exclude this new species as other well-established genera share this variation (see above for some of many examples). The large size of these worms may be a product of local environment, as specimens of *Limnodrilus hoffmeisteri* Clap., from the same localities are unusually large. A total of 67 samples which contained oligochaetes were examined in this survey, executed in three searches in 1981 (May–June, July–August, and October). The new species was found in association with other tubificids (*Limnodrilus hoffmeisteri* 18 samples, *L. maumeensis* 12, *L. udekemianus* 9, *L. cervix* 2, *Branchiura sowerbyi* 15) and on one occasion, with another unidentifiable large tubificid with bifid setae. Other tubificids were found in samples not containing *Varichaetadrilus* (*Limnodrilus claparedeianus, L. angustipenis, Aulodrilus pigueti*) and it was not associated with

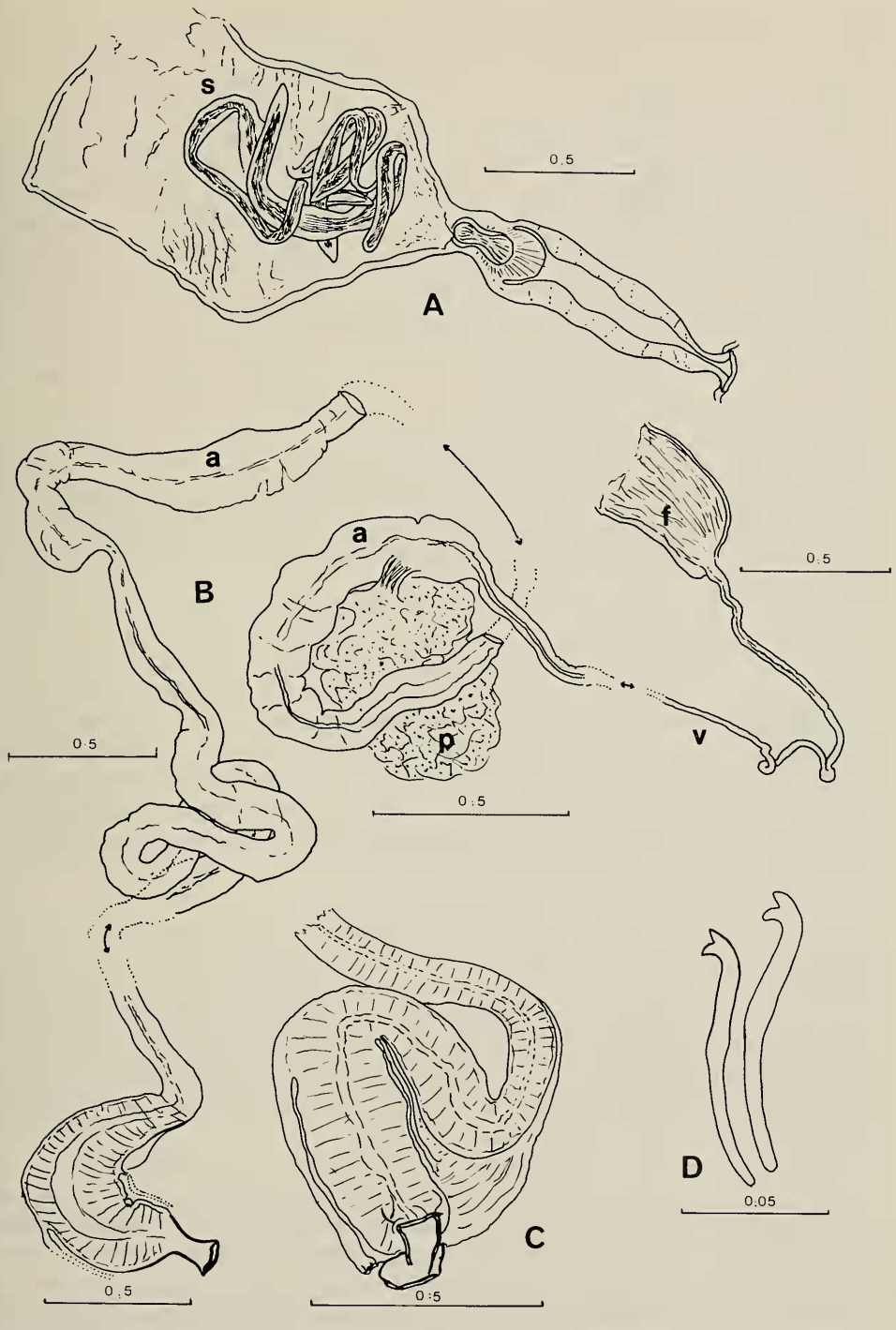

Fig. 1. *Varichaetadrilus fulleri* (from type-series): A, Spermatheca showing valve at union of duct with ampulla (s = spermatozeugma); B, Four pieces of male duct (a = atrium, f = funnel, p = prostate, v = vas deferens); C, Penis in sigmoid form of the in situ condition (teased apart in B); D, setae.

the naidids *Dero digitata*, *Nais variabilis*, *N. pardalis*, *N. bretscheri* and *Haemonais waldvogeli* or the large worm *Sparganophilus eiseni*. The new species appears to be very tolerant of organic pollution, being found in association with an indicator assemblage.

Other collections made by the authors from the Green River and its tributaries in the Mammoth Cave system (well upstream of the localities cited here) failed to reveal this new species, and so the discovery of *V. fulleri* in the Green River does not appear to be due to downward migration from a refuge cave environment. As we know of no unique characteristic of the Green River, we can only assume that *V. fulleri* has been overlooked or mistaken for a *Limnodrilus* species until now, and that it is, in fact, widely distributed. However, the senior author failed to find it in his examination of all of the collections of the Academy of Natural Sciences, Philadelphia, from the rivers along the southeast seaboard of the U.S.A. up to 1962, and the junior author has similarly identified material from detailed studies in Tennessee, Alabama, Georgia, and some sites in South Carolina without seeing it, and it has not been reported by scientists actively working with oligochaetes in Louisiana. It is possible that it forms part of a lower Mississippi fauna, a suggestion confirmed by the recent independent discovery of the species by C. R. Bingham (personal communication), who will describe that material elsewhere.

Varichaetadrilus pacificus (Brinkhurst, 1981)
Fig. 2

Seven specimens of this species were found in the Columbia River at Snag Island (lower elevation, samples A and E, August 1980, Miller Sands area) by Dr. R. J. Diaz from samples collected by the U.S. Corps of Engineers. All seven lack hair and pectinate setae, and are therefore termed the *bifidus* form of the species. One other fragment has a few sparse hair setae and may also belong to this species, but that could not be determined.

This finding further substantiates the belief that the presence of hair and pectinate setae can probably be affected by environmental conditions. This site is subjected to occasional intrusions of salt water. The senior author has also seen specimens of the *bergi* and *blanchardi* forms of *T. tubifex* from springs 70 km from Tripoli, Libya (Dr. C. S. Woods, personal communication), but the *bergi* forms had hair setae in postclitellar bundles only. Such sites are well known to have elevated conductivity levels in the water. The *blanchardi* form was recently reported from France by Giani and Martinez-Ansemil (1981), in the Eau Salée, which descriptive name alone makes the point.

Poddubnaya (1980) obtained new material of the *bergi* form from the type-locality (Lake Issyk-Kul). She stated that the presence of the typical form and the variant form in the same locality precludes the possibility of regarding these as subspecies, as discussed earlier by Brinkhurst (1971) who reduced these variants to "forms" and who has subsequently used this terminology consistently for this same setal variation where other characteristics do not differ. Poddubnaya presents measurements of 14 characteristics of the male ducts and spermathecae, giving error terms (the number of specimens measured is 100 or more of each

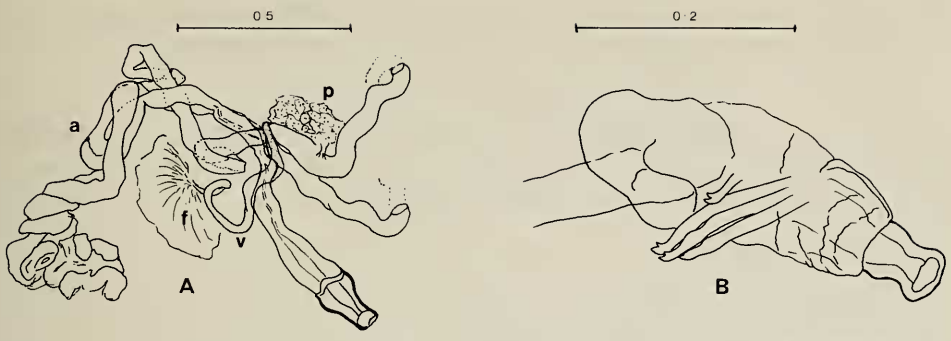

Fig. 2. *Varichaetadrilus pacificus*, bifidus form: A, Male duct from funnel to penis, fragmented; B, Penis with penial setae.

form). These values establish the fact that the size of these parts may be smaller (vas deferens parameters) or larger (atrial parameters) in the *bergi* form in comparison to the *tubifex* form, but the form of the parts is quite similar. The only major distinction (in our opinion) may be the gradual transition between the narrow and wide parts of the longer vas deferens in *tubifex* as opposed to the gradual transition in *bergi*, though Poddubnaya also describes differences in the positions of pharyngeal glands and postseptale of the anterior nephridia, characters that are difficult to evaluate as they are so seldom described.

The final resolution of this problem of potential setal variation within a species will, of course, only be solved if the *bergi* and *blanchardi* forms of *T. tubifex* (or one of the other species showing this same set of variations) can be produced by culturing experiments.

The reference to setae in the generic definition should be omitted. This characteristic should only be used in those genera in which the hair setae are characteristically absent.

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